

## A New Approach to Case Theory

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This paper presents a theory on Case or thematic roles that is based on the aspectual properties of verbs. Focus on the contribution of thematic roles to the internal temporal structures of verbs makes it feasible to define and constrain thematic roles in a more useful fashion than has been possible under existing Case theories. Additionally, doing so ensures a clearer understanding of both the internal configuration of thematic roles as well as the relationship between them. This theory offers an easy formalization of our intuitive understanding of rudimentary semantic structures of sentences. It also formalizes the role of specificity in the distinction of aspectual classes of verbs.

### I. Previous theories

Since Gruber's [1] and Fillmore's [2] publications on Case have drawn attention to the potential of exposition of the relationship between conceptual structures of predicates and surface grammaticalization of the arguments, study of Case or thematic roles has been carried out using the two main approaches adopted by the two researchers. One approach, which might be termed the 'notional' approach, is an attempt to capture the intuitively discernible relationship between predicates and their arguments. A large amount of research has been conducted on Case from this approach and has contributed to our understanding of language, but there is yet little agreement as to its nature and definitions. For instance, Fillmore has changed the inventory and names of case roles several times [2, 3, 4, 5, 6]. Palmer [7] mentions three problems with stipulation of such notional roles: (a) impossibility of precise definition of notional features, (b) difficulty in setting a limit to the number of possible roles, and (c) definitions partly based on grammatical distinctions rather than truly on notional features.

The other approach is in line with the so called 'localist' theory, which was implicit in Gruber [1], but developed into a system in Anderson [8] recognizing a semantic parallelism between spatial (source - location - goal) and transitivity (agent - patient - experiencer) relationships. Ostler [9] developed a computing machinery of semantic roles of the arguments from a combination of thematic roles, predicate operators (BE, GO, DO, CAUSE) and semantic classification of verbs (motion, possession, etc.). A main problem with this approach lies in the difficulty in finding the parallelism between spatial verbs and all other verbs.

Jackendoff [10], which differs in many respects from Jackendoff [11, 12, 13] based on the localist theory, claims that 'the terms *Theme*, *Agent*, and so on, are not primitives of semantic theory', but 'are relational notions defined structurally over conceptual structure, with a status precisely comparable to that of the notions Subject and Object in many syntactic theories.' That is, *Agent* is assumed to be the first argument of the Event-function CAUSE, and the Goal, the object to which motion proceeds is the argument of the Path-function TO. He also assumes that conceptual roles fall into two tiers: a *thematic tier* dealing with motion and location, and an *action tier* dealing with Actor-Patient relations. That is, a single argument noun phrase (NP hereafter) has multiple thematic roles. Some examples are given in (1) [10: 259]<sup>1</sup>:

- (1)     *Actor /Theme: Sarah walked (for hours).*  
           *Actor /Agent, Patient/Theme: Emily threw the ball.*  
           *Actor /Agent, Patient/Source: Sam skinned the rabbit.*

The italicized roles are 'dominant' thematic roles of verbs linked by the linking rule with the syntactic roles. Jackendoff [10] has solved some problems that were present in his previous research [11, 12, 13] including the problematic Thematic Hierarchy (see Gee [14], Alam [15]), but he has not justified the use of functions (GO, STAY, BE, ORIENT, EXT, CAUSE) in conceptual structure, and problems lie here. For instance, the difference between BE and STAY is not clear from the statement in Jackendoff [10:44] that '(t)he arguments of STAY, which denotes statis over a period of time, are the Thing standing still and its location, as seen in *Bill stayed in the kitchen* ' and that 'BE is used for specifying the location of objects (*The dog is in the park*).'

The current theory proposed in this paper assumes, as in Jackendoff [10, 11], Dowty [16] and Van Valin [17] among many, that some types of event, in particular those of accomplishment and achievement among Vendler's aspectual classes, are complex events and have conceptual structures having embedded structures. These researchers have developed a system of semantic representations for predicates which involves the embedding of simple verbal functions, such as BE, HAVE and BECOME. Each system proposed by the three researchers differs in the number and names of verbal operators. For instance, in Van Valin [17] *the baby broke the watch* is represented as [do' (*the baby*) CAUSE [BECOME broken' (*the watch*)] and in Jackendoff[10] *Bill opened the door* is expressed as [CAUSE ([Thing BILL]), [GO ([Thing DOOR]), [TO [OPEN]]]]).

Dowty [18] proposes the notion of 'proto-roles'. In his theory the only thematic roles required for syntactic argument selection are two cluster-concepts called *Proto-Agent* and *Proto-Patient*, and an argument of a verb may bear either of the proto-roles (or both) to varying degrees. Contributing properties for the Agent Proto-Role are deemed to be volitional involvement in the event or state, causing an event or change of state in another participant, movement and so on, whereas those for the Patient Proto-Role, undergoing change of state, being causally affected by another participant, being stationary relative to movement of another participant, and so forth. Although this theory has shed light on several points regarding the mapping between thematic roles and syntactic functions, to recognize just two major roles is not sufficient to represent event structures of predicates, as will be demonstrated below.

## II. Current Theory

A theory of thematic roles presented in this paper will be built on the basis of the theory of aspect of verbs. Because semantics of verbs is pertinent to the examination of the aspectual properties, consideration will be given into semantics of verbs. For instance, the fact that the English verb *arrive* has the aspectual property of being punctual is understood from the semantics of the verb referring to the final moment of reaching. In this paper I will first describe the aspectual system upon which the current theory is based, and then examine what thematic roles are required for each aspectual class of verbs.

### II.1 Aspect

Verbs<sup>2</sup> may denote either dynamic events or states. In particular, events referred to by verbs are often subevents segmented into time intervals, and thus temporally and often causally related to other subevents or states. While tense concerns the temporal ordering of events or states with respect to the time of speech, other events

or other states, aspect concerns the internal organization of such temporal properties of events or states as duration, instantaneity, frequency, initiation, completion and change of state.

Semantic categorization of verbs has been a difficult task mainly because of the great variety of events and states denoted by verbs. However, Vendler [19] has presented a promising semantic categorization of verbs according to the aspectual properties of verbs. He divides verbs into four classes: states, activities, accomplishments, and achievements. States like *contain* and *love* denote a stable situation, whereas activities like *walk* and *push a cart*, accomplishments like *draw a line* and *build a house*, achievements like *spot an airplane* and *arrive at an airport* refer to dynamic events requiring input of energy for their occurrence. The three types of dynamic events differ according to whether they are bounded (telic), durative or both. Activities consist of homogeneous successive subevents, and can begin or end arbitrarily at any stage. That is, activities can have an arbitrary endpoint which is the beginning or end of an event. (States are homogeneous, but do not consist of successive phases. They have first or last moments, but they are not defined by endpoints.) Accomplishments and achievements have natural endpoints, because accomplishments and some achievements denote resultative states of affected objects and other achievements denote the final moments of events. Further, both activities and accomplishments denote action, hence durative events while achievements that denote the final moment of an event denote punctual events. Thus, verbs are categorized in terms of presence or absence of their inherent aspectual properties, as shown in (2a). Example English verbs are given in (2b):

(2) a. Aspectual Classes and Aspectual properties

	States	Activities	Accomplishments	Achievements <sup>3</sup>
Momentary	-	-	-	+
Definite	-	-	+	+
Process	-	+	+	-
(Dynamic	-	+	+	+) <sup>4</sup>

b. Examples<sup>5</sup>

States	Activities	Accomplishments	Achievements
know	run	recover from cold	spot an airplane
believe	walk	walk a mile	recognize an error
have	push a cart	draw a circle	lose money
be dead	think about	kill	die
be pleased	watch	cool (tr)	cool (intr)

Van Valin [17] points out that Vendler's classification of verbs has been demonstrated to be a valid organization of the verbal systems of many languages such as Lakhota, Tagalog, Sama, Yatye, Tepehua, Italian, Georgian, Icelandic, Mparntwe Arrernte and Bribri (see p. 43 for the source of research of each language), and concludes that '(i)t would not be unreasonable to hypothesize that these distinctions are the universal basis of the organization of verbal systems in human language.' The current approach to Case theory focuses on the explicit and implicit aspectual properties of the arguments and NPs inherited from verbs that are their governing heads. The following section presents thematic roles viewed from the perspective of participation in the aspectual configuration of the verb.

## II.2 State predicates and thematic roles

Change of state is a major aspectual property as undergoing change is a temporal process. Whether an entity implies change of state is a criterion used for aspectual categorization. State verbs refer to either state with or without implication of change of state: a temporary state indicating change of state likely to occur<sup>6</sup> and a permanent state. Example (3) shows that in Japanese a difference between two types of state is reflected in the use of two different relationals, *wa* and *ga*:

- (3) a. *Yuuhi-wa akai.* (Them-V)  
           setting sun      red  
           '(In general) the setting sun is red.'  
           LCS: [BE [red'(the setting sun)]]<sup>7</sup>
- b. *Yuuhi-ga akai.* (Patient-V)  
           setting sun      red  
           '(At the present moment) the setting sun is red.'  
           LCS: [BE [red'(the setting sun)

SOON BECOME NOT red'(the setting sun) ]

When the state of the sun denotes a property deemed to be permanent, the subject of the sentence is followed by *wa*, whereas when the state is interpreted as a transitory state, it is followed by *ga*. An entity that is an argument of a predicate without implication of change of state is called *Theme*, whereas the one that implies change of state is called *Patient*. Neither Theme arguments or Patient arguments refer to entities with implication of voluntary involvement in events or states. They denote essentially stationary entities.

States may require reference to the extent as in (4):

- (4) a. *This highway runs from Houston to Austin.*  
           (Theme-V-Source-Goal)  
           LCS: [BE [run' (this highway)  
   SOURCE (Houston), GOAL (Austin)]
- b. *This weighs ten pounds.* (Theme-V-Extent)  
           LCS: [BE [weigh' (this) EXTENT (ten pounds)]]

Therefore thematic roles, Extent (cf. Andrews [29]), Goal, and Source are called for. The semantics of the Source argument of *run* in (4a) indicates the beginning of the extent of the highway, and that of the Goal argument the endpoint. The thematic role, Goal may also represent entities denoting a reference point, which is the endpoint of the extent of the resemblance in (5):

- (5) *Musuko-wa chichioya-ni nita.*  
       my son-Topic    father-Goal    resemble  
       'My son resembles his father.' (Theme-V-Goal)  
       LCS: [BE [niru' (musuko, chichioya)]]

Another relevant point is that many verbs of cognition are state verbs. Most cognitive verbs involve two entities that are cognizants and objects for cognition. Objects for cognition can be represented by Theme, because they lack implications of change of state. Cognizant entities are often called *Experiencer* in the literature. However, as is stated in Wittgenstein [30: section 150], cognizant entities of state predicates do not undergo processes, but rather are those that are able to understand, hence the use of the term *experiencer* is avoided because of its association with processes. The term *Cognizant* is introduced to represent the subject argument of such state predicates as *know*, *believe* and *have*. Some examples are given in (6):

- (6) *I love that woman.* (Cognizant-V-Theme)

LCS: [BE [love' (I, that woman)]]

- I have five children.* (Cognizant-V-Theme)

LCS: [BE [have' (I, five children)]]

### II.3 Activity predicates and thematic roles

Unlike Theme, Patient and Cognizant which refer to entities void of force causing dynamic events, Agent refers to entities that act without external input of energy or act and cause change of state. That is, Agent represents the primary entities that willfully participate in a dynamic event. Agent entities imply that they spend time planning and preparing with the intention to accomplish their goal, perform the act and so on. Therefore Agent inherently implies duration, and it is the thematic role of the subject argument of an activity or accomplishment predicate.

Activities refer to ongoing homogeneous events, and do not imply qualitative change of state (although motion verbs such as *swim*, *walk* and *carry* denote change of location). Therefore activities do not take the Patient argument. Activity predicates also do not imply endpoints of events that delimit duration of the events. Accordingly activity verbs denoting a linear movement preclude Goal or Extent arguments that set a limit to the range of action. They can take the unbounded Path argument, as given in (7b). The beach is viewed as an unbounded area. Some activity verbs can have two agents as in (7c). Activity predicates do not take the Theme argument which refers to a specific entity or a specific quantity of entity or entities and thus implies a temporal boundary for the action. They can take the arguments that elaborate the action.

Compare *He ate* in (7a) and *He ate rice* in (7d). *Rice* in (7d) just elaborates the action named by the verb:

- (7) a. *He ate.* (Agent-V) LCS: [DO [eat' (he)]]  
 b. *He walked the beach.* (Agent-V-Path)  
 LCS: [DO [MOVE [walk' (he) PATH (the beach)]]]  
 c. *He walked his dog today.* (Agent-V-Agent)  
 LCS: [DO [walk' (he)] CAUSE [DO [MOVE [walk' (his dog)]]]]  
 d. *He ate rice.* (Agent-V-Nonspecific Theme)  
 LCS: [DO [eat' (he, rice)]]

An argument very characteristic of activity predicates is the one that denotes a moving object or a moved object without implying the involvement of voluntary will. The thematic role of the argument is called *Motile* here. It has not been independently identified and named in the literature of Case theory, but its identification well characterizes a certain group of motion verbs. Examples are given below:

- (8) a. *He rolled the ball this afternoon.* (Agent-V-Motile)  
 LCS: [DO [roll' (he)] CAUSE [DO [MOVE [roll' (the ball)]]]]  
 b. *The ball rolled.* (Motile-V)  
 LCS: [DO [MOVE [roll' (the ball)]]]  
 c. *He pushed the cart along the street.*  
 (Agent-V-Motile-Path)  
 LCS: [DO [push' (he)] CAUSE [DO  
 [MOVE (the cart) PATH (the street)]]]  
 d. *The wind was blowing hard.* (Force-V)  
 LCS: [DO [blow' (the wind)]]

The thematic role *Motile* inherently implies duration, and therefore it appears only in activity or accomplishment predicates. As understood from the above representation of

the LCSs of activity predicates, in the current theory the argument of the DO operator is Agent in most cases, and Motile or Force in some cases.

#### II.4 Accomplishment predicates and thematic roles

Activity predicates change to accomplishment predicates when they acquire elements that set a temporal boundary for the action. For instance, the argument *rice* in *he ate rice* in (7d) should not refer to a specific (token) rice or a specific amount of rice, because if it does, it delimits the action and sets a temporal boundary for the action (Van Valin [17: 35]; Dowty [16: 63]<sup>8</sup>). Tenny [31: 7] also notes that '(a) delimited event is one that the language encodes as having an endpoint in time.' Thus, If the object NP *rice* in (7d) is changed to an NP such as *a bowl of rice*, the activity event, (7d) changes to an accomplishment event, *he ate a bowl of rice*, in (10a), referring to a delimited act of eating over a particular amount of time. Further, often the same NP sets a temporal boundary for the action in one context, but it does not in another context (Declerck [32:791]):

- (9) a. *The artist made this statuette in one day.*  
 b. *The artist made this statuette for years.*

In (9a), which is an accomplishment sentence, *this statuette* refers to a specific (token) entity, and therefore delimits the duration of the action. In (9b), which is an activity sentence, *this statuette* means this type of statuette, and therefore denotes an indefinite number of statuettes. What is important to note then is that the aspectual class of some verbs is determined by whether an argument, in particular the Theme argument, refers to a specific entity or a specific quantity of entities. Thus the Theme argument of an activity is called here *Nonspecific Theme*, whereas that of an accomplishment is termed *Specific Theme*.

Furthermore, if the Path argument of the verb *walk* in (7b) changes to the Goal argument which refers to a specific entity, the resulting sentence is no longer an activity, but an accomplishment as in (10b), implying the state of the walker being at the destination. The same can be said if the unbounded Path argument changes to the bounded Extent argument such as *two miles* in (10c):

- (10) a. *He ate a bowl of rice.* (Agent-V-Patient)  
 LCS: [DO [eat' (he) ]  
 CAUSE [BECOME NOT exist' (a bowl of rice)]]  
 b. *He walked to the park.* (Agent-V-Goal)  
 LCS: [DO [MOVE [walk' (he) GOAL (the park)]]]  
 c. *He walked two miles today.* (Agent-V-Extent)  
 LCS: [DO [MOVE [walk' (he) EXTENT (two miles)]]]

As seen above, conversion of a verb from an activity to an accomplishment is predictable from the configuration of the thematic roles. This predictability suggests that there may be only one lexical entry for these verbs, and that the aspectual status of the predicate is computed from the constitution of the thematic roles, as shown in (11):

- (11) a. *walk* (Agent), { $\emptyset$ , Path, Agent, Extent, Source, Goal}<sup>9</sup>  
 activity: (Agent), {Agent} {Path}  
 {Nonspecific Goal} {Nonspecific Source}  
 accomplishment: (Agent), {Agent}, {Specific Source},  
 {(Extent, Specific Goal)}  
 b. *eat* (Agent), { $\emptyset$ , Nonspecific Theme, Patient}  
 activity: (Agent), { $\emptyset$ , Nonspecific Theme}  
 accomplishment: (Agent) (Patient)

This possible conflation justifies the practice often followed in the literature of grouping activities and accomplishments into one class called *action*. This is a classification based on agentivity.

Accomplishments such as *make a chair* and *paint a picture* refer to activity as well as its completion. That is, they denote complex events consisting of activities and the resulting states, as shown in (12):

- (12) Accomplishment -> Activity predicated of Subject  
+ State predicated of Object

Entities involved in accomplishment predicates are Agent, Force, Motile, Specific Theme, Patient, Specific Goal, Specific Source, and Extent. Examples of accomplishment predicates:

- (13) a. *John made a chair.* (Agent-V-Patient)  
LCS: [DO [make' (John)] CAUSE [BECOME exist' (a chair)]]  
b. *The heater melted the butter.* (Force-V-Patient)  
LCS: [DO [melt' (the heater)]  
CAUSE [BECOME melted' (the butter)]]  
c. *Mary cleared the dishes from the table.*  
(Agent-V-Specific Motile-Source)  
LCS: [DO [clear' (Mary)] CAUSE  
[MOVE (the dishes) SOURCE (the table)]]  
d. *They cleared the streets (of snow).*<sup>10</sup>  
(Agent-V-Patient)  
LCS: [DO [clear' (they)] CAUSE  
[BECOME cleared' (the streets)]]

In (13b), as *the butter* is subject to change over the time, it is the Patient argument of *melt*. The object of *clear* is the Motile argument in (13c) and the Patient argument in (13d). It is often said in the literature that the object of the *of*-variant receives the 'holistic' interpretation. The present analysis reflects this linguistic fact. (See Levin [33] for references to locative alternation.)

## II.5 Achievement predicates and thematic roles

Achievement predicates such as *spot an airplane*, *reach the top of a mountain* and *die* refer to events denoting an instantaneous moment of completion which may or may not involve change of state of entities. Thematic roles of entities involved should not imply duration. Therefore they should not include Agent, Force, Motile, Extent or Path. The semantics of thematic roles should be delimited ones as well as those that should not imply duration. Therefore the Theme should be Specific Theme.

In general, as stated in Dowdy [16: 63], when the subject or object argument of an achievement is semantically nonspecific, for example, by being an indefinite plural or a mass noun, the semantics of the sentence implies duration, as below:

- (14) a. *\*John met an interesting person on the beach all summer.*  
b. *John met interesting people on the beach all summer.*  
c. *\*John discovered that quaint little village for years.*  
d. *Tourists discovered that quaint little village for years.*

Although (14b) and (14d) contain the aspectual properties of being telic, the focus of the sentences has shifted from completion of an event to ongoing activities, thus allowing cooccurrence of a durational adverbial *all summer* or *for years*. For economy, there should be a global mechanism predicting this focal shift rather than having each lexical entry for an achievement containing this information:

(15) Focus Shift from Completion to Action<sup>11</sup>

If a sentence with an accomplishment or achievement verb contains an NP argument which is nonspecific in terms of reference and quantity <sup>12</sup>, the resulting sentence is an activity with the focus on its action rather than on its completion.

Therefore, when it is a nonspecific NP, the Patient argument in an accomplishment or achievement predicate should be analyzed as the Nonspecific Theme, because focus does not lie on the change of state of the argument, and the argument serves mainly as an elaborator of the verb. Examples are given below:

- (16) a. *A stranger killed the man.* (Agent-V-Patient)

LCS: [DO (a stranger) CAUSE [BECOME killed' (the man)]]

- b. *Bill killed flies (when he was bored).* (Agent-V-Nonspecific Theme)

LCS: [DO [kill' (Bill, flies)]]

Achievement predicates of some languages such as English have the thematic role that may be called *Causer*. Causer is a thematic role involved in the aspectual configuration of predicates because it indicates an aspect of an event being viewed from the end-point with disassociation from time involved in action. The focus here is only on the final caused result and the identification of the causal agent. In (17) *This knife* is the Causer argument of *kill*, and the sentence is an achievement event:

- (17) a. *This knife killed Jack.* (Causer-V-Patient)

LCS: [CAUSE (this knife, BECOME killed' (Jack))]<sup>13</sup>

Table (18) shows characterization of thematic roles proposed in the current theory using features:

(18)	Agent	Force	Causer	Motile	Cognizant	Theme	Patient
Causative	±	±	+	-	-	-	-
Action	+	+	-	+	-	-	-
Intent	±	-	-	-	-	-	-
able-to-understand	+	-	-	-	+	-	-
change-of-state	-	-	-	-	-	-	+
change-of-place	±	±	-	+	-	-	-

Following is a table of thematic roles that may appear in each aspectual class:

(19)	State	Activity	Accomplishment	Achievement
-----	Agent	*Agent	-----	-----
-----	Force	*Force	-----	-----
-----	-----	-----	-----	*Causer
Cognizant	-----	-----	-----	*Cognizant
Theme	Nonspecific Theme	*Theme	-----	*Theme
-----	Motile	*Motile	-----	-----
Patient	-----	*Patient	-----	*Patient
Source	Source	*Source	-----	*Source
Goal	Goal	*Goal <sup>14</sup>	-----	*Goal
Extent	-----	*Extent	-----	-----
-----	Path	-----	-----	-----

(The symbol \* indicates that the argument with the thematic role must be specific.)



The numbers of thematic roles or characterizing features are not definitive. There is a strong possibility that besides thematic roles and features of universal nature there are language-specific thematic roles and features. For instance, Causer and Force are not in the inventory of intrinsic thematic roles<sup>15</sup> in Dutch [36] and Japanese. Therefore sentences with the Cause or Force argument as the subject are not grammatical in Dutch and Japanese. The thematic structure of the Japanese transitive verb *akeru* 'open' is (Agent, Patient) while the English counterpart is ((Agent, Causer, Force)), Patient). Therefore a Japanese equivalent of *the key opened the door* is expressed using the intransitive verb *aku* 'open (intr)' and a postpositional phrase denoting the extrinsic Causer argument:

- (20) a. *Sono kagi-de doa-ga aita.* {Patient-V}  
           the key-Causer door-SUB opened  
           LCS: [BECOME *aku*' (doa)] CAUSER (sono kagi)  
       b. *The key opened the door.* (Causer-V-Patient)  
           LCS: [CAUSE (the key, BECOME open' (the door))]

In Japanese CAUSER is a modifier of a rudimentary event projected from the semantics of a verb whereas in English CAUSER is a participant of a rudimentary event. That is, there is a difference in the thematic structures of the transitive verbs denoting opening in English and Japanese. The thematic structures of the intransitive verbs meaning opening are the same in English and Japanese. Also, as understood from the above tables, in the proposed theory of Case the thematic role experiencer used in the literature is represented as Agent when it undergoes processes and as Cognizant when it does not.

<sup>1</sup>The two tiers in Jackendoff [10] differ from the two levels of the localist theory, the spatial and transitivity relationships in that the roles in the two tiers do not form a one-to-one correspondence.

<sup>2</sup>This study focuses on the semantic properties of verbs rather than their syntactic properties. Therefore the theory of verbs advocated in this paper also applies to verbal nominals denoting state or event such as *existence* and *destruction*.

<sup>3</sup>Platzack [20] calls the same four verb classes *states*, *unbounded processes*, *bounded processes* and *punctual events*.

<sup>4</sup>The feature *dynamic* is mine. This is an equivalent to *occurrence* in Mourelatos [21]. Different scholars have characterized their aspectual classes using different features, as illustrated in the following table [22:65]:

Hoeksema [23]	Mourelatos [21]	Dowty [16]	Carlson [24]
±Duration	±Occur	±Change	±Extended
±Count	±Count	±Definite	±Continuous
	±Momentary	±Complex	±Point

<sup>5</sup>Verkuyl (1972) correctly points out that Vendler's classification should apply to a proposition or semantic sentence rather than to a verb because, for example, to spot an airplane is an achievement, but to spot airplanes is not. Therefore, the use of the term *verb* or *predicate* in this paper should be interpreted as that of *proposition* or *semantic sentence* projected from the verb.

<sup>6</sup>Pustejovsky [26] divides states into two types: static and dynamic. Static states include *know*, *believe*, *have* and *love*, and dynamic states include *stand*, *support* and *sit*. The dynamic types are a subset of the state types implying change of state defined in this

paper. Milsark [27] observes that several peculiarities of the existential construction in English can be accounted for if we assume two types of states.

<sup>7</sup>For the sake of exposition I use a formalism to represent the lexical conceptual structure (LCS) of a predicate which is formulated based on Dowty [16], Jackendoff [10], Pustejovsky [28] and Van Valin [17]. It may change in the future.

<sup>8</sup>Dowty [16:63] assumes a general principle with respect to the change from accomplishments and achievements to activities: If a sentence with an achievement verb contains a plural indefinite NP or mass noun NP (or if a sentence with an accomplishment verb contains such an NP as object), then it has the properties of a sentence with an activity verb.

<sup>9</sup>The thematic role in round parentheses indicates an obligatory argument.

<sup>10</sup>The NP of snow is not an obligatory phrase.

<sup>11</sup>This slightly differs from Dowty [16:63] in that semantic features are analyzed as the determining factors rather than such syntactic features as a mass noun and bare plural in Dowty (See Note 8 above). See also Declerck [32] for a detailed discussion on the effects of specific/nonspecific ('bounded/unbounded') NPs on the aspect of sentences.

<sup>12</sup>It is easier to define semantically the factors delimiting the action than syntactically. In (9) we have seen that one and the same NP can have two semantically different interpretations. Another example that supports preference to a semantic treatment is that a definite article followed by a single NP may denote an indefinite number of entities named by the NP:

*The student president distributed the college ring to graduating seniors.*

Here *the college ring* denotes an indefinite number of rings.

<sup>13</sup>The formalism of LCS for the Causer subject is similar to that in Farrell [34:54].

<sup>14</sup>When the Goal argument refers to a property or attribute of an entity, as in *the signal turned red* (Patient-V-Goal), the rule of specificity does not apply.

<sup>15</sup>An intrinsic argument is defined as one that is involved in the configuration of the verb aspect in a language. This theory allows a neat definition of distinction for intrinsic and extrinsic arguments. See Pinker [35:40-41] for discussion on the difficulty of the distinction. This theory deals with the thematic roles of intrinsic roles. The treatment of the thematic roles of extrinsic arguments awaits future research.

## References

- [1] Gruber, Jeffrey. *Studies in lexical relations*. Cambridge, Mass.: MIT Dissertation, 1965.
- [2] Fillmore, Charles. Toward a modern theory of case. The Ohio State University project on linguistic analysis, report 13.1-24. Columbus: Ohio State Univ., 1966.
- [3] Fillmore, Charles. The case for case. In *Universals in Linguistic Theory*, ed. by E. Bach and R. Harms, 1-90. New York: Hold, Rinehart, Winston, 1968.
- [4] Fillmore, Charles. Types of lexical information. In *Semantics*, ed. by Danny D. Steinberg and Leon L. Jakobovits, 370-392. Dordrecht: Reidel, 1971.
- [5] Fillmore, Charles. Some problems for case grammar. In *Languages and linguistics working papers*, 2., ed. by Richard O'Brien. Washington, D.C.: Georgetown Univ. Press, 1971.

- [6] Fillmore, Charles. The case for case re-opened. In *Grammatical Relations* (Syntax and Semantics Series, 8) ed. by Peter Cole and Gerald Sadock, 59-82. New York: Academic Press, 1977.
- [7] Palmer, Frank R. *Grammatical roles and relations*. Cambridge; Cambridge University Press, 1994.
- [8] Anderson, John M. *The Grammar of case: toward a localistic theory*. Cambridge: University Press, 1971.
- [9] Ostler, Nicholas. 1980. *A theory of case linking and agreement*. Bloomington: Indiana University Linguistics Club, 1980.
- [10] Jackendoff, Ray. *Semantic structures*. Linguistic Inquiry Monograph 19. Cambridge, Mass: MIT Press, 1990.
- [11] Jackendoff, Ray. *Semantic interpretation in generative grammar*. Cambridge, Mass.: MIT Press, 1972.
- [12] Jackendoff, Ray. Toward an explanatory semantic representation *Linguistic Inquiry* 8, 89-150, 1976.
- [13] Jackendoff, Ray. *X Syntax: A Study of Phrase Structure*. Cambridge, Mass.: MIT Press, 1977.
- [14] Gee, James Paul. Jackendoff's thematic hierarchy condition and the passive construction. *Linguistic Inquiry* 5.304-308, 1973.
- [15] Alam, Yukiko Sasaki. *A Theoretical Approach to the Japanese Verbal System with Computational Implications*. Austin, Texas: UT Dissertation, 1986.
- [16] Dowty, David. *Word meaning and Montague grammar*. Dordrecht: Reidel, 1979.
- [17] Van Valin, Robert D., Jr. A synopsis for role and reference grammar. In *Advances in Role and Reference Grammar*, ed. by Robert D. Van Valin, Jr., 1-164. Amsterdam: John Benjamins, 1993.
- [18] Dowty, David. Thematic proto-roles and argument selection. *Language* 67. 547-619, 1991.
- [19] Vendler, Zeno. *Linguistics in Philosophy*. New York: Cornell Univ. Press, 1967.
- [20] Platzack, Christa. *The Semantic Interpretation of Aspect and Aktionsarten, A Study of Internal Time Reference in Swedish*. Dordrecht: Foris, 1979.
- [21] Mourelatos, A. P. D. Events, Processes and States. *Linguistics and Philosophy* 2, 415-434, 1978.
- [22] Verkuyl, Henk J. *A Theory of Aspectuality Interaction between Temporal and Aspectual Structure*. Cambridge: Cambridge Univ. Press, 1993.
- [23] Hoeksema, J. Plurality and Conjunction. In *Studies in Modeltheoretic Semantics*, ed. by A. G. B. ter Meulen, 63-83. Dordrecht: Foris, 1983.
- [24] Carlson, Lauri. Aspect and Quantification. In *Syntax and Semantics 14: Tense and Aspect*, ed. by Philip Tedeschi and Annie Zaenen, 31-64. New York: Academic Press.
- [25] Verkuyl, Henk J. *On the compositional nature of the aspects*. Dordrecht: Kluwer, 1972.
- [26] Pustejovsky, James. The geometry of events. In *Generative Approaches to Aspect*, ed. by Carol Tenny, 19-40. Cambridge, Mass.: MIT Lexicon Project, 1988.
- [27] Milsark, G. L. Toward an Explanation of Certain Peculiarities of the Existential Construction in English. *Linguistic Analysis* 3, 1-29, 1977.
- [28] Pustejovsky, James. The Syntax of event structure. *Cognition* 41, 47-81, 1991.

- [29] Andrews, Avery. The major functions of the noun phrase. In *Language typology and syntactic description*, vol. 1: *Clause structure*, ed. by Timothy Shopen, 62-154. Cambridge: Cambridge University Press, 1985.
- [30] Wittgenstein, Ludwig. *Philosophical Investigations*. (Trans. by G. E. M. Anscombe). New York: Macmillann, 1953.
- [31] Tenny, Carol. *The Aspectual Interface Hypothesis*. (Lexicon Project Working Papers 31). Cambridge, Mass.: MIT Lexicon Project, 1988.
- [32] Declerck, Renaat. Aspect and the bounded/unbounded (telic/atelic) distinction. *Linguistics* 17, 761-794, 1979.
- [33] Levin, Beth. *English Verb Classes and Alternations*. Chicago: Univ. of Chicago Press, 1993.
- [34] Farrell, Patrick. *Thematic Relations and Relational Grammar*. New York: Garland, 1994.
- [35] Pinker, Steven. *Learnability and cognition The acquisition of argument structure*. Cambridge, Mass.: MIT Press, 1989.
- [36] Voorst, Jan van. *Event Structure* (Current Issues in Language Theory 59) Amsterdam: John Benjamins, 1988.

#### Appendix: Example sentences annotated with thematic roles

(This is not an exhaustive list.)

##### States:

- a. Source-V-(Cognizant)-Theme: *he reminds me of his mother; the high fever indicates a serious sickness*  
EX. LCS: [BE [indicate' (the high fever, a serious sickness)]]
- b. Cognizant-V-Theme: *I fear God; I know it; I have a son; I love her; I see a hill; I smell it; I believe that ...*  
EX. LCS: [BE [fear' (I, God)]]
- c. Theme-V-Cognizant: *it seems to me that ...; it is funny to me; the movie was interesting to him; it's strange to me*  
EX. LCS: [BE [funny' (it)] COGNIZANT (me)]
- d. Theme-V: *the sun is big; that mountain is high; he is tall; that he told a lie is true; it exists; it is well-known*
- e. Patient-V: *John is sick; the tea is hot; John is drunk*  
EX. LCS: [BE [sick' (John)] SOON BECOME NOT sick' (John)]
- f. Theme-V-Goal: *the house sits on the top of the hill; he adheres to his opinion; this is similar to that*  
EX. LCS [BE [similar' (this, that)]]
- g. Theme-V-Source-Goal: *the highway runs from Austin to Dallas*
- h. Theme-V-Extent: *the river extends for two miles*

##### Activities:

- a. Agent-V: *John walked; Bill worked; Mary sang; Beth laughed; Be brave; Don't be a clown*  
EX. LCS: [DO [work' (Bill)]]; LCS: [DO [brave' (you)]]
- b. Agent-V-Nonspecific Theme: *Mary watched TV; he listened to music; he eats rice; he builds houses*  
EX. LCS: [DO [watch' (Mary, TV)]]
- c. Agent-V-Motile: *Bob pushed the cart; he drives a car; he carried it; John spun thread*

- d. Agent-V-Path: *Bill walked the beach*  
EX. LCS: [DO [MOVE [walk' (Bill) PATH (the beach)]]]
- d. Agent-V-Agent: *John walks his dog; John jumped his horse*  
EX. LCS: [DO [MOVE [walk' (John)]]  
CAUSE [DO [MOVE [walk'(his dog)]]]]

**Accomplishments:**

- a. Agent-V-Patient: *a stranger killed Tom; I fractured a knee cap; he broke the window; I built a house; John frightened me; Mary annoyed him*  
EX. LCS: [DO [build' (I)] CAUSE [BECOME exist' (a house)]]  
EX. LCS: [DO [frighten' (John)] CAUSE [BECOME frightened' (I)]]
- b. Agent-V-Patient-Goal: *he changed the garage into a room*  
EX. LCS: [DO [change' (he)] CAUSE [BECOME a room' (the garage)]]
- c. Agent-V-Motile-Goal: *I put it on a chair; I pushed a cart to the door*  
EX. LCS: [DO [push' (I)] CAUSE [MOVE (a cart) GOAL (the door)]]
- d. Agent-V-Specific Theme: *I read a book; Bill watched the program*  
EX. LCS: [DO [read' (I, a book)]]
- e. Agent-V-Specific Theme-Cognizant: *I told the story to Mary; I told Mary that ...; I suggested to them that ...*
- f. Agent-V-Motile-Source: *he cleared the dishes from the table*
- g. Agent-V-Extent: *he walks two miles; John swims ten laps*

**Achievements:**

- a. Causer-V-Patient: *the knife killed Tom; this knife cut the bread; the hammer broke the window*  
EX. LCS: [CAUSE (the hammer, BECOME broken' (the window))]
- b. Patient-V: *Tom died; the glass broke; the door opened; I collapsed; it improved; it darkened; it exploded*  
EX. LCS: [BECOME dead' (Tom)]
- c. Causer-V-Patient-Goal: *the chemical changed the color to red*  
EX. LCS: [CAUSE (the chemical, BECOME red' (the color))]
- d. Patient-V-Goal: *it turned into water; the signal changed to red*  
EX. LCS: [BECOME water' (it)]
- e. Causer-V-Patient: *the idea frightened me; it annoyed him; the sound distracted me; her words puzzled me*  
EX. LCS: [CAUSE (the idea, BECOME frightened' (I))]
- f. Cognizant-V-Specific Theme: *I spotted a stain; I learned it; I dropped it; I stopped it; he lost it*  
EX. LCS: [BECOME spot' (I, a stain)]
- g. Cognizant-V-Goal: *Tom arrived in Kyoto; they reached the top*  
EX. LCS: [BECOME arrive' (Tom) GOAL (Kyoto)]
- h. Cognizant-V-Specific Theme-Source: *I received the letter from John; I heard it from Bill*  
EX. LCS: [BECOME receive' (I, the letter) SOURCE (John)]
- i. Specific Theme-V-Source: *the letter came from John; he departed from N.Y.; he fell from the step*  
EX. LCS: [BECOME come' (the letter) SOURCE (John)]

